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Canada's Role in World Agricultural Development

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President
International Development
Research Centre

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The Issue

At the simplest, my concern is world food supplies. The decline in global grain output in 1972 consequent upon an unprecedented, widespread drought, and the decision in many countries, particularly the USSR, to maintain livestock herds, became for many a demonstration that the 18th century musings of the Rev. Thomas Malthus had finally come to pass — world population growing at over 2% per annum had outstripped demand for food growing at close to 4%. A World Food Conference was called by the United Nations, and various tracts, warnings, articles, pontifications, and profundications were issued by the mighty and the less mighty on the need "to do something" to assure that all mankind would be free from want.

It is now about 4 years since food prices began to climb in the wake of the 1972 harvest shortfall. The UN Conference has come and gone, and although it has left some roiling of the formerly tranquil outlook on food, there seems little evidence today that the ferment of a few months ago has had a continuing presence on the urgent agendas of world issues.

There may be good reason for this. The fickle rains in northern Latin America, middle Africa, eastern Europe, western, southern, and southeastern Asia that depressed the global outturn of cereals in 1972 seem now a transitory and coincidental phenomenon. Harvests continue uncertain in all parts of the world, but the more normal circumstance of rain in most places, if not in all, has returned world cereal production to its approximately normal path of growth at 2.8% per year. In international and domestic markets, food prices have eased in both absolute and real terms; harvests of North America this year hold promise of rebuilding the stocks of grain that have, for the past 30 years, provided the world with a cushion of security against massive famine.

But how far can men of perception afford to relax? The International Food Policy Research Institute (IFPRI) estimates that for Asia this year, a better than average year by the usual weather standards, grain outturn will continue below the longer-term trend by over 2%. Asia, with its teeming masses, is where famine stalks with its most fearful tread. Indeed, an IFPRI study of current world trends — and I would like to give emphasis to the word "current" — of the world demand and supply for grain reveals that by 1985-86, Asia (excluding China) will have a net deficit of approximately 40 million metric tons; and the developing countries as a whole will be 85 million tons short of balancing indigenous production with demand.

On the face of it, the mathematics of Rev. Malthus may yet mock the seeming ephemeral emphasis on food that world leaders accorded it in 1972 to 1974. For those who hunger or live in fear of hunger, there is only a little solace

that stocks are being rebuilt in North America, or that world prices have eased; for those who process the statistics and sort the computer printouts, there is little observable evidence to ease the grimness of the prognosis.

In essence, the world's great uptapped agricultural resources lie in the tropics. The territorial areas of the developing countries now produce less than one-third of the aggregate global farm output. Within their boundaries lie two-thirds of mankind. If present trends continue, the first will approach one-quarter and the latter will rise to three-quarters by the turn of the century.

There is little doubt that the physical environment of the tropical world can be exploited for an immense food abundance if the resources of capital and technology are mobilized and applied, and if the policies of economic development of the developing nations are brought to reflect both the political will and the organized political action necessary to foster an agricultural transformation of their farm economies and rural societies.

I need not burden you with a recital of the where and how the tropics can be made to produce vastly more. Many in this audience know the story better than I. Instead, I want to focus my few remarks on the role Canada can and, I think, should play in promoting the transformation of world agriculture.

Food Production Strategy

At the World Food Conference in 1974, someone, probably from FAO, put forth the figure that investment in official external assistance to agricultural development in the tropics should grow from roughly $2 billion in 1973 to $5 billion per year over the next 20 or so years. The figure is obviously notional. No one can say with any pretence to accuracy how much outside help developing countries really need to modernize their farming sectors. One figure seems as good as the next, especially if it is substantially more. Unfortunately, in the years since the Conference, there is little else than this notion upon which to base a judgment of our progress. In 1974, there was no overall global strategy to conquer hunger; in 1976, there is still no strategy; worse, there is no effort to produce one. (As an aside, it is perhaps worth noting that global strategies are being discussed or implemented for the control of nuclear energy, for environmental monitoring, for smallpox eradication and malarial control among other diseases, for monetary affairs, for ocean exploitation, even for controlling raw material prices. Admittedly, these areas are less complex than an expansion of world food production, but surely no more important! Yet neither the world's instrument for food, the FAO, nor any other UN body or other agency has been given a mandate to build the basis for international dialogue on a development program that would ensure all peoples of a future free from want.)

But even without an overall approach to world food problems, it is possible to focus on the outlines of such a strategy. Like the old milking stool, agricultural development rests upon three legs: an available, adapted and proven improved farm technology; the economic incentive to reward the risks of its adoption by cultivators; and the supply and market structures to bring the farmers the inputs necessary for the exploitation of these new technical opportunities, and to receive and compensate them for the product of their labours. I will take each of these in turn.

Agricultural Technologies

The International Development Research Centre (IDRC) and the Canadian International Development Agency (CIDA) were two of the founding members of the Consultative Group for International Agricultural Research (CGIAR) when it was established in 1971. Today, this Group of over 20 nations, the regional development banks, the FAO, the World Bank, the United Nations Development Program (UNDP), and four private foundations or foundation-like agencies, will generate over $80 million in 1977 to support

the development and adaptation of new agricultural technologies at 10 international agricultural research centres scattered throughout the developing world. Canada, through the contributions of CIDA and IDRC, is the second largest national donor to the CGIAR after the USA. This year, Canada contributed more than $5 million to the work of the international agricultural research institutes.

I cannot overstress the importance of this work. Its roots lie in the advances made by the four international research centres established during the 1960s by the Ford and Rockefeller Foundations. The work of the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) on high-yielding wheat, which was built on the earlier work of the Rockefeller Foundation in Mexico, was recognized in 1970 by the award of the Nobel Peace Prize to Dr Norman Borlaug, the director of the centre's wheat improvement program. The development of high-yielding varieties of rice by the International Rice Research Institute (IRRI) in the Philippines has given new hope and new potential to rice farmers throughout the world. In the past 5 years, the CGIAR has established six new research centres that are now working for the improvement of all the major world food crops as well as cattle and sheep in the main tropical and semitropical ecological zones.

Although the work of these institutes is exciting in both scope and depth, the technological frontier for tropical agriculture is far from being penetrated. And although Canada in playing a central role in this endeavour through the participation of biological scientists from Quebec, Guelph, Winnipeg, Saskatoon, Edmonton, and Vancouver in the activities of this growing network of international centres, the participation can and should be larger. For it to be so, greater efforts must be made to enlarge the scope of involvement of Canadian scientists, and arrangements must be found to ensure the continuity of their participation over the longer periods of time required for the completion of important scientific investigations. Both the IDRC and CIDA have a responsibility to take this in hand. However, there are significant practical limitations on both agencies. Canada is not easily suited to conducting applied research that will be readily adaptable to tropical environments. The potential contribution of Canadian agricultural research scientists to the finding of new agricultural technologies suited to the tropics and semitropics is either as co-workers with scientists at international or national institutions located in the developing nations, or as investigators working in Canada on some of the more basic problems of applied science and technology that can and need to be studied in the well-equipped laboratories and greenhouses of our own research centres. The IDRC and CIDA have used both of these arrangements on several occasions. For the IDRC, however, budget size and the basic mandate of its establishment, that is, to assist in building in the developing regions an indigenous research capability, focuses its aid on the direct support of scientists in the developing countries so that they can proceed with the work of adapting to indigenous conditions the technologies of worldwide agricultural science. The IDRC associates expatriate investigators with developing-country researchers only if there is a clear and apparent need for external professional help. And Centre assistance for work in Canada must be justified on the basis that it is critically required research that can only be undertaken in well- or uniquely equipped centres outside the developing areas.

In effect, the mandate for involving Canadian research workers in direct assistance to developing nations falls with greater weight upon CIDA. And

although the Agency has been very active in mobilizing Canadian talent to assist in generating new technologies for the advancement of agriculture in the tropics, it has not yet built a program strategy that would use to the full, and on a sustained basis, Canada's capability in the agricultural sciences. The reasons are many; three among them deserve mention for they apply to both organizations.

The first is the uncertain relation between the direct flow of federal government financing to Canadian universities and institutions of higher learning and the flow of provincial resources to the same institutions, whether this flow comes directly from provincial budgets or from a pass-through of other federal grants to education. In other words, and not surprisingly in Canada, the vexed question of federal-provincial financial aid and jurisdictions in education is an unwitting constraint to Canada's involvement in the promotion of world food security.

But let me not make too much of this constraint. More important is the difficulty of focusing Canadian capabilities on the problems at hand. Canada is endowed with both too few and too many institutions of higher learning and research competence: too few in the sense that a grant to one raises expectations in all, and invidious questions of "why did we not receive one also?"; too many in the sense that involving all scatters nickels and dimes in a manner that assures no one will receive enough to be productive. As yet the Canadian academic community has not answered the challenging need to concentrate and coordinate the research capacities of the nation in a manner that will ensure an effective full employment of national talent on solving difficult and complex problems whether national or international. Responsibility for devising mechanisms for such a coordination rests with the universities. It is only from actions by their administrations and faculties to break and bridge the separateness of the nation's institutional structures that a true mobilization of Canadian capabilities can be effected. There is little concrete indication that these actions are likely in the near future.

The third constraint is less fundamental, but nonetheless real. It is the low status often accorded by the Canadian academic community to research on applied technologies for use in the developing countries. Too often I have heard the refrain that work abroad or in this country on problems of importance to development brings little benefit when reviewed by one's colleagues assessing promotion prospects or tenure appointments. The young scientist especially is influenced by the fear this engenders. But the lower esteem given to research on technologies useful to low-income countries affects us all and makes it hard to turn our best talent to non-Canadian problems. For some reason, many who are, or aspire to be, senior scientists consider the problems of the tropical world as being behind the frontiers of present-day science and, therefore, solvable by the exercise of more primitive skills, experience, and knowledge. The facts are usually the opposite. Work on tropical problems most frequently demands the highest of scientific skills and excellence. The scientific frontiers of tropical agriculture are sometimes different from those of the temperate zones, but it is a special kind of narrowness of outlook and understanding that leads some of our scientists and science administrators to hold that time spent working on issues not related or applicable to Canadian problems adds little to research competence and, therefore, can be given only marginal weight in any careful review of professional qualifications. It is an outlook that inhibits the mobilization and wholehearted application of

Canadian technical capacity for advancing knowledge of how to transcend the present technical limits to expanding global food output.

Economic Incentives

The second leg of the stool of agricultural progress is the economic incentive for developing-country farmers to adopt new methods of agriculture. National economic policies for fostering agricultural progress are obviously a matter for the sovereign decisions of individual countries. But there is an overwhelming body of evidence that points to a singular failure in nearly all developing countries to adopt policies that provide an incentive for agricultural innovation and modernization.

The spread of high-yielding varieties in some parts of Asia, Latin America, and Africa has demonstrated to even the most confirmed skeptics that farmers will respond to personal economic opportunity if the price ratios and profit margins are attractive. They seldom are. The economic climate for the so-called "green revolution" in Asian grain production in the late 1960s was set by highly remunerative prices for farm output and low prices for fertilizer, irrigation water, and other inputs. The ratios of prices paid to those received gave a strong encouragement for farmers to produce to the maximum capacity of their land. This structure of incentives followed several years of production shortfalls due to fickle weather. But as soon as the granaries began to fill again, the role of incentives in agricultural progress was forgotten, and public policies stressed, as they had in the past, the provision of cheap food for the urban consumer.

There seems little doubt that even if new, high-yielding varieties of wheat and rice had not been available to launch a "green revolution," grain output would have risen in Asia as the rains returned, on the basis of the strong pull of profits from food cultivation alone. The reversal of incentive policies following the jump in the growth of output in the late 1960s contributed to a drop in this growth and provided powerful evidence that the supply function for food in the developing nations is responsive to price and profit changes. When new technological opportunities are added to an attractive structure of economic incentives, the traditional rural economies of the developing nations suddenly become alive and suffused with the ferment of change — a fact most disturbing to those who argue that developing-nation farmers are stubbornly resistant to innovation requiring either a sweeping social revolution or the passage of generations to alter significantly their patterns of economic behaviour. It just isn't so. Today, we can cite an overwhelming array of examples from all parts of the world to prove the contrary.

If the farmer is responsive to economic incentives, then the logical question is why are incentives neglected, especially in the face of significant food deficits in so many countries? It is not an easy question to answer. The majority of developing-country governments seek the rapid modernization of their societies and economies, but most conceive of modernization as consisting of manufacturing industries and the physical elements and services associated with industrial-urban growth. The rural sector is regarded as the "traditional" economy from which will come labour for industry, renewable raw material commodities for processing or export, and cheap food for a growing urban proletariat. In this vision, the rural economy is a supplier of resources; it does not compete for investment allocations with the urban,

industrial, or other "modern" sector infrastructures. The exploitation of the rural economy to build a modern urban-industrial economic base has long been a theme of the literature on economic development; it has an honoured history in the experience of Western industrial nations; and it is hard to envisage an alternative in a world where external aid is meagre relative to need, and the material expectations of newly sovereign peoples place heavy and insistent pressures on their governments to build national industrial capacities that will open nonfarm job opportunities and assure an evergrowing supply of industrial produced goodies for local consumption.

If overall economic development is to be based on the exploitation of the farm and rural economies, it is hardly surprising that both investment finance for agriculture and incentive policies for greater farm production have little place in the plans and programs of Third World nations. Of course, there is always a part of any national economic plan devoted to the importance of agriculture and the rural economy — no politician can ignore the 60-80% of the population living and working in the rural regions of the nation — but aside from its prominent position as the third or fourth chapter in the plan document and the always careful assurance that agriculture and rural development have the paramount call on the resources and talents of the nation, the implementation of this part of the plan invariably lags behind, often far behind, the efforts made on power, ports, steel plants, city expansion, and the many other aspects of a "modern" state.

The result, after 30 years of building new countries, has been a failure of their agricultures to meet confidently and adequately the basic needs of their peoples. A development strategy based on the exploitation of the traditionally poor "traditional" sector has produced poor nations. The economic surplus of national rural hinterlands has fallen far short of what is needed to finance national aspirations for modernity. The bankruptcy of this exploitive policy is evident in the grim outlook for world food supplies in the next quarter century. But this policy will likely not change, and, within the framework of the poor economies of the developing countries, cannot change, unless developed nations exercise greater assertiveness than they have in the past to direct a larger portion of their assistance to the support of agricultural modernization in Third World nations, and greater leverage on these nations to formulate and implement public policies that will encourage and reward farmer innovation.

A manifestation of the willingness of the developing-country governments to exploit their own farm community for national development is the story of food aid, a story in which Canada plays and has played a prominent role. In brief, Canadian food aid, that is food purchased in Canada with money from CIDA for shipment to developing countries, has risen by over 19% per year since 1970. This year it will be approximately $220 million or about one-quarter of all CIDA disbursements for international assistance.

Food aid shipped to countries or regions that are experiencing genuine famine emergencies is both necessary and laudable. Knowing this aid is or will be available should difficulties arise provides for low-income nations a sense of security against complete helplessness should disaster strike. And although this sense of security may be used by some governments to slight their own farm development with an untroubled conscience, this is not a valid criticism of emergency relief generously given by those who have an overabundance to those who are needy from events of tragedy. One cannot but be thankful that this nation can offer such succor; may we be able to do so in future.

But not all Canadian food aid goes to assist those in emergency need. Some of it is shipped as general economic assistance to poorer countries. The grain shipments are received by the aided government, sold to their local citizens through national marketing channels with the proceeds being used to augment general revenues or for development projects agreed on between Canada and the partner nation — seemingly a most sensible arrangement, using food grown in Canada, of which we have a surplus, as an external resource to help modernize a poor country. But who bears the real cost of the transfer — someone must, for there is no free lunch even in a food-surplus nation: the Canadian taxpayer for one, they buy the grain; the Canadian consumer for another, they pay higher prices in Canada for the added market demand from CIDA. Most important for our purposes, however, is the cost borne by the farmers in the recipient nation: the price for their product is depressed by the foreign supply, a factor critical for incentive to innovate. The distribution of benefits, too, is interesting. These accrue to the Canadian farmer in the form of higher prices; to the urban consumer in the recipient nation in the form of lower prices; and to the revenues of the recipient country from the sale of the grain. In keeping with a policy of exploiting the rural economy as an avenue for development, the urban consumer is benefited by food aid at the cost of lower farm returns and sapped incentives for domestic production. In my view, our offers of food aid as general economic assistance carry with them an inherent threat to the building of a viable agriculture in the developing regions of the world.

Economic incentives for the families who produce the world's food and on whom agricultural progress rests are a much neglected part of an overall strategy for expanding global food production. They must receive attention in the future, and Canada, as a food-abundant nation, must be careful that its actions, however well and generously motivated, do not erode or destroy these important forces for innovation and development.

Infrastructures of Farm Services

The third leg of the stool is establishing the complex and extensive networks of roads, transport systems, communications, depots, extension services, credit facilities, processing and storage plants, even the industrial base needed to service and serve a modern agricultural industry and the rural people who are the fundamental labour force of that industry.

To give some idea of the magnitude of the task, we can draw examples from many parts of the world. The cost of developing the vast irrigation potential of the Indo-Gangetic plain of India, including major river developments in Nepal, is estimated at between $20 and $40 billion, roughly half of the annual gross national product of that subcontinent country. Although such an investment might almost double the world's potential to produce grain, for India to announce and plan a development program for this purpose would be roughly equivalent to the Government of Canada announcing its intention to launch a development program, say in the North, that would cost a projected $90 billion. Indeed, in Canada one-tenth of this amount for a pipeline is cause for a national debate! It would be absurd for us to plan on such a scale, and equally absurd for India.

For the nations of the African Sahel, the problems are even greater. It has been proposed that if between $20 and $25 million were spent over the next 30-50 years, it would permit the development and exploitation of the five

major Sahelian rivers, the Lake Chad basin, and the underground water reserves that lie beneath this arid land to enable these very poor countries to assure a long-term abundance of crop and livestock output relatively free of the recurrent threat of drought. It is a development dream as far as these nations are concerned. The price tag is more than 10 times as large as the total gross annual production of the countries involved.

And the catalog could go much further. In all cases, the costs would be heavy and the national capacities to meet them too minimal to matter.

The fact is: agricultural modernization and development is expensive and the countries who need and would benefit most from its acceleration are too poor to finance its undertaking. The potential to feed the world, and feed it well with secure supplies, is clearly open to mankind; the resources to seize this potential lie, in the main, with the developed, industrial nations. In the past 4 years, these nations have contributed roughly $2.6 billion per year to agriculture and rural development, and to the development of agriculturally important industries and irrigation infrastructure. It is a large amount; but it is also less than 2% of the military expenditures made by the same countries. In fact, it is about equal to the 1975 net profits of the Exxon Corporation, and only two-thirds of the gross sales of the giant General Foods Corporation.

What has Canada contributed to this endeavour? The figures are not easily traced through the many categories of Canadian assistance. For example, between 1969 and 1975, CIDA contributed more than $80 million to the support of Non-Governmental Organizations (NGOs) such as religious charities, private assistance groups, etc., that have extensive overseas programs of aid, assistance, and relief. Many of these groups give help to farm development projects; perhaps as much as $10 million of the NGO sum went for these purposes. Canadian programs of technical assistance also have an important focus on agriculture, either directly or indirectly. Canada's substantial assistance to multilateral agencies such as the World Bank, the United Nations Development Program, the Asian Development Bank, and so on, enable these agencies to build their record of contributions to agricultural development through their operations. (In total, multilateral agencies of this type account for about 55% of the $2.6 billion of total annual assistance from the industrial nations allocated to agriculture and rural development.) And there are many indirect elements of CIDA support that go through food aid, debt relief, and spin-offs from projects in other sectors that have a direct or indirect impact on agricultural and rural development in the recipient nations. This means that whatever CIDA lists as direct assistance to agriculture will understate the total Canadian contribution by a significant amount. Nevertheless, it is in the direct CIDA help for world agricultural development that the play of Canadian policy for the world's future food supply is to be found. Although the record is not one about which to be overly boastful, it is one we can view with pride.

In 1974, CIDA disbursed close to $55 million for agriculture and rural development, approximately 11% of all disbursements on bilateral aid, that is, aid given directly from Canada to recipient nations. In 1975, this amount rose to close to $72 million, an increase of 31% and almost 14% of total bilateral assistance. In CIDA's program classification, assistance to agriculture rates fifth after aid to transportation, potable water supplies, education, and electric power development. And if each of these categories were carefully dissected, it would be found that a substantial portion of this assistance would have a direct impact upon the rural and farm populations of the recipient nations.

A Future Role for Canada

But it is not the record that will dominate the remainder of my remarks. I want now to turn to the future role that Canada might play in fostering world agricultural development. I have already suggested that more might be done to involve Canadian scientists and research institutions in the international efforts to develop new farm technologies. I believe also that Canada can provide a new leadership for rich and poor nations alike in setting a course that will assure the world's peoples of their food supplies well into the next century.

Within the developing regions of the world, the demand for food is met mainly through the consumption of cereals. This demand increases as the sum of population growth and the degree to which the desire for better diets can be filled from an expanding personal economic affluence. Population growth seems relatively insensitive to short-period pressures of public policy. Various projections can be made about the rate of growth and level of personal disposable income in developing countries. Assembling the country statistics and projecting forward on the basis of a probable level of income growth in each developing country, the IFPRI staff estimates that to close the gap by 1985 between the growth in cereal supplies and the growth in their demand will require a 50% increase in the rate of growth of grain production, that is, from roughly 2.8% per year to over 4.25%.

I have indicated that this seems technically and physically possible but only at a major cost in resource allocations to the agricultural modernization of the tropical nations. I have pointed to the development of an infrastructure of services for the innovating farmer as being the most expensive part of that modernization process. But when one digs behind just what elements of this infrastructural development should be stressed, the picture varies markedly from region to region, country to country, and even between parts within the same nation. On the Gangetic plain of India, the immediate need is for a massive investment in irrigation and drainage; in the sub-Saharan Sahelian zone of Africa it is for transport, livestock watering wells, range rehabilitation, and irrigation development in a program that carefully articulates activities in sequence and in concurrence over various geographic areas; in many parts of Latin America, transportation, farm supply, and market depots are the greatest need; on the island of Luzon in the Philippines, the most pressing requirement is improved transportation, farm credit institutions, and better systems of water management, and so on. In each case and for each geographic zone, there is a determinable development strategy that will push farm production to new levels. In many areas, the rate of return in terms of more food produced to the investments needed, at least with present technologies

and infrastructural costs, will be low. In a world concerned with the urgency of expanding its food supplies, these areas must be accorded a low priority. But in many other areas, the returns will be high if the infrastructural investments build upon each other to reinforce and complement the purposes of each. This is the essence of a global food development strategy. It will be built from a compilation of geographic development opportunities with appropriately phased programs to create the physical appurtenances and institutional capabilities to assist and support an innovative agriculture. If these opportunities are grasped and combined with suitable research into new farm production technologies and policies of economic incentives for their adoption, the total configuration will hold the promise of a secure food future.

Unfortunately, there are no signs that any agency is even beginning the long, hard study necessary to produce the component pieces of such a strategy. Nevertheless, the lessons inherent in building a framework for strategic planning are readily transferable to guide the policies and actions of international assistance agencies. The World Bank is now actively collaborating with several countries to develop rural and agricultural modernization programs in which investments will be phased for various activities in a manner that ensures an interlocking complementarity, and in which economic policies are to be pursued that will be conducive to farmer innovation. These are necessarily large investment schemes that will stretch over several years. Indeed, in analyzing these programs and the suggested proposals from other countries and agencies, there is no evidence that development assistance activities that place small amounts of money here and there on an ad hoc basis can generate any impetus to a substantial and discernible rise in food output. The most frequently cited example of successful small assistance is the experience of Asia in the late sixties with the "green revolution." Supposedly, the release of large amounts of seed of fertilizer-responsive, high-yielding, dwarf varieties of wheat and rice was enough to break a significant bottleneck to obtaining a high-output agriculture. Although the cost of developing these dwarf varieties was not high, a few million dollars in research financing, and even seed supplies were relatively inexpensive to acquire, it is incorrect to argue that this cost was the only expenditure necessary to open the way to an improvement in grain farming. The high-yielding varieties did break a bottleneck. But their contribution to output was dependent upon their inclusion in a package of farm practices that combined the seed with heavy doses of fertilizer and large quantities of water applied at critical times during the crop cycle. The new varieties found their most suitable application in those geographic areas where investments in the infrastructures of irrigation, market depots, fertilizer and seed supply facilities, extension services, and credit facilities had already been made. The new varieties required massive imports of fertilizer to attain their genetic promise. In 1968, India alone spent over $280 million for fertilizer imports, the financing being made available from both multilateral and bilateral aid agencies including Canada. In fact, the ingredients of the "green revolution" demonstrate forcefully the importance of interlinking large flows of international assistance with the capacities of the recipient nations to focus and control the ingredients of this assistance so that it flows to the farm level in the substance, form, and timing needed to support the innovative production decisions of the cultivator. Although the whole episode has looked deceptively simple to the outside observer, its success rested upon the careful cooperation

of external donors with local government authorities, private industry, petty traders, and millions of small cultivators.

In many respects, the Asian experience with the expansion of wheat and rice production in the late 1960s and early 1970s rests upon a unique situation that is unlikely to be replicated elsewhere. In few developing regions are the infrastructural elements present merely awaiting one or two exotic ingredients to break a bottleneck. A secure food future will rest upon the willingness of donors to commit large resources over substantial periods of time for very ordinary and unromantic things like roads, market stores, fertilizer bags, and cement pipe.

The record of such a willingness on the part of Canada is clear. CIDA's list of current agricultural projects shows a commitment of resources and technical help for a wide scope of activities worldwide. Total project budgets as of March 1976 for agriculture, forestry, fisheries, wildlife, rural roads, support for Canadian fertilizer purchases, and so on, total about $300 million, an amount that will be paid out for these various activities over the next several years as the projects mature. Over half of this is for fertilizer credits that will permit recipient countries to buy fertilizer ingredients, particularly potash, in Canada. About $16 million is allocated to crop development in 18 projects that range in size from $6000 for wheat improvement in Zambia to $5 million for rapeseed purchases by Bangladesh. At $20 million each, projects in forestry and in fisheries are important components of CIDA's assistance for the development of renewable resources in the Third World. Slightly over $20 million has been allocated to irrigation and well development, and in assisting these activities CIDA joins with many other organizations in laying stress upon this important aspect of infrastructure creation. In fact, in the majority of developing countries the name of the food game is irrigation. The characteristic rainfall pattern in the tropics is one of alternating wet and dry periods. Tropical food output can be greatly expanded if water is harvested and stored in the wet periods and used for irrigation in the dry seasons.

(As an aside, assistance for the construction of irrigation systems provides an excellent example of the complexities besetting external aid agencies who seek to accelerate world agricultural development. Irrigation projects have been, and are, an important component in the portfolio of activities of most international assistance organizations. Many, too many, of these projects have been or will be unproductive because of faulty designs, that is, designs unsuited to the physical and social environments of the tropical nations. The traditional experience with irrigation in the Third World has been mainly with systems constructed to deliver a little water over a lot of acreage in order to ensure a minimal crop in case of drought. Such systems are seldom adequate for the needs of high-output farming, which demand the delivery of large volumes of water in precise flows within narrow timing limits. Many assistance agencies, including the World Bank in its earlier days, and many recipient countries have incorporated traditional design norms, not modern needs, into their new irrigation works. The result has been the development of costly irrigation infrastructures without the capacity to support the modern intensive production technologies farmers wish to use.)

The current array of CIDA projects for agriculture and rural development arise from the month-to-month response to requests from the nations we wish to help. These requests seek aid for an assortment of activities that have little connection with each other. All are undertaken because we and

our partners in the developing world have a reasonable expectation that each will make a substantive contribution to the economic prosperity and to the well-being of rural people in the recipient nation. Although one can disagree about some of the judgments that lead to these expectations, such disagreements are only matters where men of integrity differ. Much more fundamental, to my view, is the fact that the present portfolio of Canadian agricultural aid to the developing countries should give way to a portfolio that has as its central theme a set of high food-return activities that focus on the immediate and emerging needs of national or regional rural development with projects that are articulated one with the other, and integrated through time and across geographic space.

I said earlier that I believed Canada could exercise a new leadership in fostering world development for food production. This nation has the capacity that, if tapped and imaginatively mobilized, could assist the major developing nations to identify and prepare the set of projects that build and interlock into national programs for food abundance. Such programs are not expensive to design, indeed, the costs in money and talent are well within Canadian capabilities. And besides resources and human skills, this nation has a unique world status that should be exploited for the benefit of all mankind. Canada is the second largest world food exporter; we are a middle power with no imperialistic background, trusted by both rich and poor alike; our heritage of many cultures and languages, our wealth and income, our scientific and engineering competence, our experience in working with developing nations, in short for reason upon reason, Canada can take a frontal position in world fora and among nations as a country that approaches the problem of assuring food for all on a basis that is objective and free from suspicion of national political greed. Once Canada has earned world respect for the objectivity and expert content of the set of projects identified and prepared with Canadian assistance, I believe it will not be difficult to organize the international consortia of donor agencies necessary to obtain the commitments and assemble the vast resources required for bringing plans to reality.

In using our capacities we must strive to allocate our talents to the critical global food priority regions. South Asia with its close to 800 million people, some parts of Southeast Asia, and the climatically vulnerable areas of sub-Saharan Africa, are the main geographic regions where harvest shortfalls could leave many millions vulnerable to famine; a vulnerability that will increase as populations grow, and one that we in North America will find increasingly difficult to offset with the bland assurance of a few years ago.

Conclusion

The barrier to expanding world food output is the lack of political will and action by both rich and poor. It is not technical and it is not economic. In the final analysis, Canadian help for the development of world agriculture will rest on the extent to which we in Canada gear our assistance to an established and sustained strategy that has as its aim the fostering of long-term world food security. We have not reached this point yet. We have, however, the mechanisms in the IDRC and CIDA to draw upon the full array of global experience in agriculture, and we have in the nation the capacity to assess and assimilate this experience and to derive from it the lessons upon which a Canadian assistance strategy can be built. We have the talent and even a little of the resources (the Canadian aid budget is $1 billion this year), which, if wisely used, can do much to ease the spectre of global hunger. And we have the respect as a nation with an immense capability in agriculture to set a standard for others as to how talent and resources can best be used to augment significantly the world's capacity to feed its peoples. We can take seriously the slogans of "no hungry child" that echoed at the World Food Conference. We can show by example how these slogans translate to reality. We cannot reach the goal alone, but we can stand firm in urging rich and poor nations alike to gird for the long conquest of hunger that lies ahead. And we can insist that all the agricultural resources of the nation be mobilized and applied to that task. Canada has an extraordinary record of generosity, of willingness, nay, eagerness, to help those who are less fortunate and who seek to help themselves. However, the urgent issues before the world demand wisdom as well as generosity and eagerness. I believe that collectively we in Canada can muster that wisdom. I do not believe it has been mustered yet. The time to do so is now. There is little time left if the peoples born and to be born are to receive their daily bread.